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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
BEST, ZACHARY P				
ART UNIT		PAPER NUMBER		
1795				
NOTIFICATION DATE		DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

## Application No.

10/524,145

## Applicant(s)

HENNIGE ET AL.

## Examiner

Zachary Best

## Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 24-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 24-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/5508)  
Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**ELECTRICAL SEPARATOR COMPRISING A SHUT-DOWN MECHANISM,  
METHOD FOR THE PRODUCTION THEREOF AND ITS USE IN LITHIUM  
BATTERIES**

Examiner: Z. Best    S.N. 10/524,145    Art Unit: 1795    September 10, 2008

**DETAILED ACTION**

1. Applicant's amendment filed on July 31, 2008 was received. The specification was amended. Claims 11-23 were cancelled. Claims 1-8, 10, and 24-25 were amended. Claims 26-33 were newly added.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action issued on May 30, 2008.

***Specification***

3. The abstract of the disclosure is objected to because the length exceeds 150 words. Correction is required. See MPEP § 608.01(b).
4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Objections***

5. The objection to Claim 4 is withdrawn because Claim 4 was amended.

6. Claim 31 is objected to for being identical in scope to Claim 8.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 27-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Regarding Claim 27, the instant specification discloses examples where the particles melt at 120°C and examples where the particles melt at 150°C; however, there is no disclosure of a range in which the particles melt at between 120-150°C. Regarding Claim 28, the specification discloses the coating which is porous, electrically insulating and inorganic and preferably ceramic; however, the specification does not disclose a coating that is 100% or fully ceramic. Therefore, the specificity that is required for Claims 27-28 is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. If Applicant believes Examiner is in error, Examiner asks that Applicant specifically point to the specification where Applicant believes the matter was disclosed.

9. The rejections under 35 U.S.C. 112, second paragraph of Claims 1-2 is withdrawn because Claims 1-2 were amended.

***Claim Rejections - 35 USC § 103***

10. Claims 1-8, 10, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer et al. (US 6,632,561 B1) in view of Hying et al. (WO 99/62620). Subsequent references to Hying et al. are made based on corresponding US 6,620,320 B1.

Regarding Claim 1, Bauer et al. teach a lithium battery separator having a shutdown function, and comprising a porous carrier (col. 26, lines 25-50) wherein a shutdown layer of shutdown particles, which melt at a temperature and close the pores of said inorganic layer (col. 2, lines 25-49) present on said carrier and bonded thereto (col. 25, line 65 – col. 26, line 24). However, Bauer et al. fail to teach said porous carrier comprises a porous inorganic, nonelectroconductive coating layer on and in said carrier.

Hying et al. teach an ion-conducting composite that may be used in electrochemical apparatus (col. 1, lines 8-19) comprising a porous carrier having a porous inorganic nonelectroconductive coating on and in said carrier (Hying et al. claim 22). It is advantageous to coat the porous carrier with the ion-conducting composite because it improves relation to acids and has improved high temperature resistance (abstract and col. 1, lines 42-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium battery separator of Bauer et al. with a

porous inorganic nonelectroconductive coating on and in said carrier because Hying et al. teach that coating the porous carrier with said coating improves relation to acids and high temperature resistance.

Regarding Claims 2 and 6, Bauer et al. suggest the carrier is less than 30  $\mu\text{m}$  in thickness (col. 28, lines 1-10), and Hying et al. teach the composite material, including the porous carrier, is bendable down to a radius as small as 1 mm (col. 5, lines 8-11).

Regarding Claims 3-5, Bauer et al. teach the carrier is polymeric and nonwoven and the material of said carrier is fibers of polyester or polyolefin (col. 26, lines 44-46).

Regarding Claim 7, Hying et al. teach the use of Alcoa CT3000SG alumina particles, which has a mean particle size of 0.7  $\mu\text{m}$  as evidenced by Trübenbach et al. (US 5,935,897, Table 2).

Regarding Claim 8 and 31-32, Bauer et al. teach the particle size is 5 nm to 20  $\mu\text{m}$  (col. 3, lines 57-67, and Hying et al. teach the coated carrier has a pore width of 1 nm to 5  $\mu\text{m}$  (col. 9, lines 24-30).

Regarding Claim 10, Bauer et al. teach the shutdown particles are polymers or polymer blends (col. 2, lines 53-67).

Regarding Claim 24, Bauer et al. teach a process of preparing a battery comprising inserting the said separator into a battery cell (col. 28, line 46 - col. 29, line 15).

Regarding Claim 25, Bauer et al. teach a battery comprising said separator and one or more additional components (col. 28, line 46 - col. 29, line 15).

Regarding Claim 26, Bauer et al. teach the battery is a lithium battery (col. 29, line 55 - col. 30, lines 45).

Regarding Claim 27, Bauer et al. teach that the melting points of the particles are 120°C and above, but based on the usual operating temperature of the electrochemical cell (col. 3, lines 57-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the melting point of the particles because Bauer et al. teach that the melting temperature of the particles should be adjusted based on the usual operating temperature of the electrochemical cell. Discovery of an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272 (CCPA 1980).

Regarding Claim 30, Bauer et al. teach the meltable shutdown particles contain at least one polyolefin (Bauer et al. claim 3).

11. Claim 9 is rejected are rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer et al. in view of Hying et al., as applied to Claims 1-8, 10, and 24-25, and further in view of Treger (US 5,091,272 A)

Regarding Claim 9, Bauer et al. and Hying et al. teach the lithium battery separator as recited in Paragraph 10. However, Bauer et al. and Hying et al. fail to specifically teach the layer of shutdown particles has a thickness, which is approximately in the range from said average size of said shutdown particles up to 10 times said average size.

Treger teaches a separator with a shutdown layer for use in electrochemical cells (abstract), wherein the layer of shutdown particles is approximately 4 times greater than the average particle size of said particles (col. 5, line 56 – col. 6, line 10). It is advantageous to have this thickness because the close packed structure has a high packing density and provides more rapid shut down of the layer (col. 3, lines 48-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium battery separator of Bauer et al. and Hying et al. wherein the thickness of the layer of shutdown particles is approximately 4 times greater than the average size of said shutdown particles because Treger teaches the structure will be closely packed and provide for a more rapid shut down of the separator.

Regarding Claim 29, Treger teaches the meltable particles may be natural waxes, synthetic waxes, or polymers, such as polyethylene (col. 3, lines 5-16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute a natural or synthetic wax for a polymer, such as polyethylene, as a meltable particle in the separator of Bauer et al. and Hying et al. because Treger teaches functional equivalency of natural waxes, synthetic waxes, or polymers, such as polyethylene, as meltable particles in separators.

Regarding Claim 32, Treger teaches that the size of the meltable particles in relation to the pore size of the porous layer is directly related the permeability of the layer (col. 3, lines 48-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the particle size of the meltable particles in



relation to the pore size of the porous layer because Treger teaches the relation directly affects the permeability of the porous layer.

Regarding Claim 33, Treger teaches a layer of meltable particles having an average particle size of about 18  $\mu\text{m}$  and the thickness of said layer was 1 mil (25.4  $\mu\text{m}$ ) (col. 7, lines 39-65 and col. 5, line 5 - col. 6, line 15).

### ***Response to Amendment***

12. Applicant's arguments filed on July 31, 2008 have been fully considered, but they are not persuasive.

#### *Applicant argues:*

(a) *Hying et al. does not teach a non-electroconductive coating.*

In response to Applicant's arguments:

(a) At the outset, the term "ion conducting" is not analogous to "electron conducting" (i.e., electroconductive). An ion conducting material, such as a separator for a battery or fuel cell membrane, allows ions to pass through while the electrons go another route (normally to the load) via an electron conducting material. Examiner does agree that Hying et al. specifically teach an ion-conducting material. However, if the material were also electron conducting it would not have application such as for a fuel cell membrane (Hying et al. col. 13, lines 50-67) because the fuel cell would short circuit. Applicant further points to the language which indicates "a permeable composite material comprising... at least one

compound of a metal, a semi-metal or a mixed metal (Hying et al. claim 22).” Applicant is correct that metals are well known electron conducting materials. However, the compounds of metals, such as the oxides of iron and aluminum as taught by Hying et al. (col. 6, lines 43-44) act as insulators (non-electroconductive). See also Hying et al. col 5, lines 57-62 and col. 10, lines 17-28).

### ***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zpb

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795